II. *The* Ambe *of* Hippocrates *for reducing* Luxations *of the* Arm *with the* Shoulder, *rectified*; *by* M. le Cat, *M. D.* F. R. S. *Surgeon to the* Hôtel Dieu *at* Rouen, *and Royal Demonſtrator in Anatomy and Surgery: Extracted from the* French *by* P. H. Z. F. R. S.

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THIS is one of thoſe Chirurgical Operations which has many times puzzled the moſt skilful Surgeon. Among the Machines which Art has invented for the performing of it, *the Ambe of Hippocrates* is one of the moſt antient and moſt famous.

It is known to conſiſt of an horizontal Lever *A*, and of a fixed Point *B*. (TAB. II. Fig. 2.) made of a Piece of Wood ſtanding vertically, to the Extremity of which the Lever is joined by a Hinge. The Patient ſitting, and his Arm, that is hurt, being raiſed, the Machine is puſhed forward under the Arm-pit, ſo that the vertical Piece of Wood is applied along the Ribs, where the Lever enters into the Arm-pit up to the End of the luxated Bone, or even farther. This Circumſtance is eſſential, and even recommended by *Hippocrates*: *Imprimis vero*, ſays he, *id elaborandum eſt, ut ligni ſumma pars, brachii capite ſuperato quam penitiſſime alam ſubeat*. Sect. VI. p. 783. *Fœſii.* The Arm is tied to this horizontal Piece, and then an Aſſiſtant bears upon the *Scapula* and the *Clavicula*, as is ſeen in the Figures of *Scultetus*, Plate 21.

whilſt another preſſes down the Lever, and thus makes the Bone come into its Place again.

Hippocrates, giving the Deſcription of this Invention, and of its Uſe, acknowledges that this Method of reducing the Luxations of the Arm is incomparably better than all the others; for, ſays he, the working of it is ſufficiently powerful; and provided Care be taken to puſh the Lever farther on under the Arm-pit than where the Bone of the Arm lies, the Extenſions and Counter-extenſions are equal, and the Bone of the Arm is ſafe: He adds, That by this Method freſh Luxations are reduced ſooner than one thinks, and even before the Extenſion appears to have been made; and that, as for old Luxations, they can only be reduced by this Method; unleſs, by their being too old, the Cavity of the Articulation be be filled up, and that the Head of the Bone has formed to itſelf an Articulation in the Place where it fell: He even believes, that ſuch a Luxation may be reduced; for, ſays he, What is there that cannot be moved by ſufficient Forces? But at the ſame time he thinks that the reduced Bone will not remain in its Place, but luxate itſelf again, and fall back into the new-formed Articulation, which it has formed to itſelf.

(Here follow Hippocrates*'s Words in* Latin.)

" Hæc reponendi humeri ratio longe optima cen-
" ſetur. Juſtiſſimam enim molitionem facit, ſi vel
" ſolum intro magis quàm brachii caput lignum
" immittatur, juſtiſſimæque fiunt in utramque partem
" librationes, & oſſi brachii ſecuritatem præſtant.
" Recentia igitur opinione citius reconduntur, ac
" pri-

" priuſquam extenſio facta videatur. Quinetiam ubi
" inveteraverint, hæc ſola repoſitio reſtituere poteſt,
" niſi jam temporis lapſu caro quidem articuli cavi-
" tatem occupaverit, & brachii caput locum in quem
" declinavit, conſuetudine tritum jam ſibi fecerit;
" enimvero tamen ita inveteratum brachii luxum
" reponere mihi poſſe videtur. Quid non enim juſta
" molitio moveat? Non tamen loco manere poſſe
" exiſtimo, ſed, ut conſuevit, prolapſurum." *Loco citato.*

One of the greateſt Surgeons of our Age (M. *Petit)* in his Treatiſe of the Diſeaſes of the Bones, was ſenſible of all the Perfections of the *Ambe* of *Hippocrates:* He acknowledges with that Father of Surgery, that this Machine has *a ſufficient Force*, and is more than ſufficient——that it makes *an Extenſion and a Counter-extenſion equally ſtrong*——He even adds——that *the Arm is placed there as it ought to be, in order to relax the Muſcles*, or at leaſt *ſtretch them equally*, which is the Fourth Rule the Author propoſes to be obſerved, *p.* 42. in making the Extenſion and Counter-extenſion. But at the ſame time M. *Petit* does not diſſemble ſome eſſential Defects he finds in this Invention, and which, without doubt, were unknown to *Hippocrates*.

The capital Defect in this *Ambe* is, that *it puſhes the Head of the Bone into its Cavity, before the Extenſion and Counter-extenſion are made.* The dangerous Conſequences of this Defect, are, according to M. *Petit*, 1*ſt*, That the Reduction is very difficult, becauſe the Bone is not conducted by the ſame Way it took in luxating itſelf, and that one meets with Obſtacles from the Parts that ſurround it, even the *Scapula* itſelf, on which it articulates. 2*dly*, In making thoſe Efforts for ſurmounting thoſe Obſtacles, one runs the Riſque of turning inwards the cartilaginous Edge of the Cavity of the *Scapula*, or the *Capſula ligamentoſa*. The Second Defect of the *Ambe* of *Hippocrates* is, that *it cannot move the luxated Bone but from below upwards*; conſequently, this Machine is only proper in Luxations directly downwards; and yet it is certain, that the Arm luxates itſelf both outwards and inwards; and even it is known to all Practitioners, that Luxations forward are very frequent. Here you have a great Number of Luxations of the Arm, where the *Ambe* becomes uſeleſs: Now, if the *Ambe* of *Hippocrates* is uſeleſs in all Luxations outwards, and in Luxations inwards, which are very frequent, if it is dangerous in Luxations downwards, the only ones it is fit for, one muſt own, that this Machine, ſo much cried up by *Hippocrates*, is yet very imperfect.

Theſe Imperfections are real ones, but the Advantages, which one cannot but own it has, are ſo conſtant, and ſo ſuperior to thoſe of any other Practice, that one naturally inclines not to part with it, but becomes deſirous to remove thoſe Defects it has, without which it would certainly be, as *Hippocrates* aſſures, the moſt perfect of all Machines made uſe of in reducing a luxated Arm: For ſuppoſing an *Ambe*, which makes a ſufficient *Extenſion* and *Counter-extenſion*, before it leads the Bone into the Cavity, or at the ſame time it does ſo, and which alſo might lead it from the Right to the Left, and from the Left to the Right, as well as from below upwards, it is certain there can be no Method to be compared to this; becauſe there is none in which concur at once ſo much Force and Expedition, joined to ſuch Simplicity, Regularity, and Safety, that are quite ſingular. For that Method in which a Surgeon only employs his own Strength, and that of his Aſſiſtants, is commonly inſufficient; and the other, in which he helps himſelf with the Pulley, is perplexed with a great *Apparatus*, is long, and ſtill very much wants the Hands of the Surgeon, and of his Aſſiſtants: All which are Circumſtances which render the Method more complicated, and leſs ſure.

Theſe are the Motives that have engaged me to contrive the new *Ambe* I herewith have the Honour to lay before the SOCIETY, in which I have endeavoured to rectify all the Defects before-mentioned.

A Deſcription of the new Ambe.

TAB. II. The Baſis of the whole Machine is an Elbow-chair all of ſolid Wood, higher than others uſually are, in order to give Room to the Lever to play the more freely, which cannot be lowered any farther than to the Floor on which the Elbow-chair ſtands: To prevent any Uneaſineſs to the Patient from that Height of the Chair, it has a Foot-ſtool that makes Part of the Chair, and brings the Seat to its uſual Height.

Each Arm of the Chair is pierced with a round Hole, to receive the *Stem* or *Foot* of the *Ambe*. If the Luxation is on the Right Side, the Foot is run through on the ſame Side, and *vice verſa*. The Patient is tied partly to the Back of the Chair, partly to a Piece joined to the Chair on that Side where the *Ambe* is placed. This ſolid Union of all the Pieces of the Machine between themſelves, and with regard to the Patient, furniſh its Action with all the Force and Certainty poſſible. The *Ambe* of *Hippocrates* can play but to a ſmall Extent: It is ſeparate from the Chair in which the Patient ſits, and he is left to the Care of the Aſſiſtants; all diſadvantageous Circumſtances, which are remedied by my Machine.

In that of *Hippocrates*, the Body of the Patient has no other Support againſt the Extenſion of the Lever than the very vertical Piece (ſee TAB. II. Fig. 2. *B.)* on which the Lever reſts; this Piece is narrow, has no Proportion, or, if one may ſay ſo, no Union with the Figure of the Body to which it is applied, and conſequently muſt change his Poſition on that Piece upon the leaſt Effort the Patient makes.

The Foot of my Lever has no Connexion with the Patient's Body: There is between the Foot and his Body a particular Piece which I call *the Bodice*, repreſented in Fig. 1. TAB. III. One will ſee there, that it is made to fit itſelf to the Body; and, in order to render that Application eaſy, that Part which touches the Body, is quilted. This Bodice is fixed to the Arm of the Chair between Two large Iron Cheeks, *a*, *b*, Fig. 1. TAB. II. by Two ſtrong Iron Pins, which run through them, and are ſtopped at their Extremities with Nuts ſkrewed on. The concave Part of this Piece, where the Body enters, is placed perpendicularly under the End of the Lever, however ſo that the Lever be a little farther advanced towards the Patient, than the Bottom of the Bodice, to the end that the Lever may thruſt itſelf the better in under the Arm-pit. As there are Caſes where the Head of the Lever ought to be very ſhort, or very near the Point it reſts upon, and others again on the contrary, where that Extremity of the Lever ought to be longer, and farther off the Point of its Reſt, the Bodice of courſe ought to be ſet backwarder or forwarder, as the End of the Lever is, the Direction of which it follows every-where. For this Reaſon we have contrived Two Rows of Holes along the Sides of the Bodice, and between theſe Two Sides we got a Notch cut out, to make room not only for the Foot, or for the Point it reſts upon, which may meet there, but alſo for a Part of the Lever, which I call its Spur, which always moves towards that Notch when the Lever is lowered. The Figures and the Uſe of the Machine will ſhew the Neceſſity of this Conſtruction much better than any Deſcription. From the ſaid Bodice come out Two broad Straps of the ſtrongeſt Leather with their Buckles. One of thoſe Straps is to go about the Back of the Chair, and round the Body of the Patient; the other goes over the Shoulder, very near the Articulation, and keeps the *Scapula* and the *Clavicula* in their Situation againſt the Efforts of the Lever; ſee TAB. II. and IV.

That Part of my Machine, that may be called the *Ambe* properly ſaid, is compoſed, like that of *Hippocrates*, of Two Pieces; one vertical, which I call the Foot of the *Ambe*; and the other horizontal, which forms the Lever. It is chiefly in theſe Two Pieces that my *Ambe* differs from that of *Hippocrates*.

The Foot is a Piece made either of Wood, TAB. III. Fig. 2. or of Iron, Fig. 3. Its upper Extremity is ſplit into a ſort of Mortiſe, which receives the Spur or Tenant *T* of the Lever *A, B.* It is pierced by ſeveral Holes, which anſwer to as many others on the Spur. Below this Mortiſe the Foot becomes more ſlender and cylindrical; by this Part it enters into a round Hole in the Arm of the Chair; this ſlender Part of the Foot is pierced by ſeveral Holes, in order to run an Iron Pin through, which lies flat on the Arm of the Chair, and keeps the Foot raiſed to a Height proper for the Perſon that undergoes the Operation: For the greater Security one may run Two Pins through; one which reſts upon the Arm of the Chair, and the other on the Seat itſelf, through which the Foot paſſes alſo. The Iron Foot, Fig. 3. may be provided with a ſort of large Ring *C*, under the Pin, which will render its Rotation the eaſier. If one ſhould prefer an Iron Foot, one may eaſily judge, that the Hole for it in the Arm of the Chair muſt be made narrower, either by filling up the old one with an Iron Box or Clout, which may be taken away, if one will uſe a wooden Foot; or one may even at firſt fit thoſe Holes for the Iron Foot, ſetting the wooden one quite aſide.

The Lever *A, B, H, B*, TAB. II. Fig. 1. is the moſt compound Piece of all, and withal the moſt important. It is made of a real Lever *A, B*, and of a Piece fitted to it *D, G*, TAB. II. and III. The Lever properly ſo called *A, B*, TAB. II. is made round on its inferior Surface; the upper Surface is flat, and all along on the Middle of it there runs a Rod, forked at the End, which fits to a Groove of the ſame Figure in the inferior Surface of the Sliding-piece *F,G*, TAB. III. This Lever grows leſs and leſs towards the Extremity *A*, where the moving Power is to be applied; the other Extremity,

B,

B, is ſomewhat rounded off at its End, in order to inſinuate itſelf the better under the Arm pit. On this bigger Extremity is a ſort of *Spur* or *Tenant*, *T*, TAB. III. the upper Part of which is joined to the Lever by Two Iron Pins, ſo that, upon taking out the Pins, the Spur comes out, and ſeparates itſelf from the Lever, as appears by Fig. 4. TAB. III. It was neceſſary to make this Spur moveable, and give it the Figure of a ſquare Rule in which it appears, in order to bring it quite cloſe to the End of the Lever, or ſet it back, according as it may be neceſſary. For this Reaſon the upper Part of this Spur *a*, *b*, ſlides along in a Mortiſe or Groove of the Length of one Foot contrived under the Lever, beginning from its Extremity *B*, to which anſwers the Shoulder *b*, of the Spur.

The reſt of the Tenant, or its principal Part *c*, is fitted to enter into the Mortiſe *d*, which is the uppermoſt Part of the Foot, Fig. 2, 3. TAB. III. They are both of them pierced with a Row of Holes, through one of which one muſt run an Iron Pin, to unite them, and to form the Point of Reſt, or the Hinge of the Lever. Towards the other Extremity *A* of the Lever, there is a Piece of Iron *C*, made Arch-wiſe, under which paſſes the elaſtic Tail *D*, *f*, of the Rod faſtened to the Sliding-piece *F*, *G*, and into which catch Teeth made on the ſaid Tail, as is ſeen in TAB. III. and IV. This Iron Arch ought to be very ſolid, becauſe it keeps down the Arm, and ſupports all the Effort of the Lever. I will give to the Sliding-piece *F*, *G*, which is fitted to the Lever, the Name of the *Bracer*; it is a Groove made of one Piece of Wood, repreſented in its Situation in TAB. II. and IV. This Piece is hollow in the upper Surface, as is juſt now ſaid, to place the luxated Arm into; this Cavity is quilted, and has Three Girts *H*, with Buckles, to tie the Arm faſt and conveniently; they are made of ſtrong Leather. It has on its inferior Surface a Groove with a Dove-tail *K*, *K*, TAB. III. to lay hold of the Rod of the Lever, and to ſlide in it without being ſeparated from it, unleſs it be in ſliding beyond the Extremity *B*, of the Lever, where it pulls out like a Drawer, which is eaſily done, if the *Bracer* has nothing to ſtop it upon the Lever. The Extremity of the *Bracer*, which anſwers to the thick End of the Lever, is rounded, in order to enter jointly with it under the Arm-pit; the other gives hold to the Piece of Iron *D*, *E*, which I called above by the Name of *the elaſtic Tail of the Bracer*. This latter conſiſts of Four Parts; the Fork *F*, which attaches itſelf to the inferior lateral Surfaces of the Bracer; the Spring *f*, which is the Piece that follows next, the longeſt and ſlendereſt of all; the Teeth *E*, and the Handle *D*.

The Uſe of the new Ambe.

The Patient, being undreſſed down to the Waiſt, is placed in the Arm-Chair, as in TAB. IV. Fig. 1. Next, the Lever, furniſhed with its Bracer, is raiſed and kept in an horizontal Poſition, taking great Care, as *Hippocrates* recommends, to puſh this Bracer as far as may be under the Arm-pit to the End of the Bone of the Arm, and even beyond, if poſſible, to the end that the *Humerus*, ſupported by the Bracer in all its Length, may be ſecure againſt all the Power of this Machine, and that its Violence may only act upon thoſe Muſcles which keep this Bone out of its Place.

Beſides the Quilting, which the Bracer is lined with, a ſmall Cuſhion is put upon its Extremity, in order to lodge ſtill more conveniently the Head and the Neck of the *Humerus*, and to preſerve the ſoft Parts from any Contuſion, which the Impulſe of the Machine might produce, by its greateſt Forces acting upon that Part.

The Arm being thus placed and well ſtretched out upon the Bracer, you tie about it Two Sliding-knots, one above the Elbow, and the other over the Wriſt, after having guarded thoſe Parts with a very thick and ſoft Compreſs; the Two Sliding-knots are faſtened to the Fork of the elaſtic Tail of the Bracer; after which you complete the fixing of the Arm with the Three Girts of the Bracer, under which are alſo put Compreſſes like thoſe juſt mentioned.

The Arm being thus well adjuſted, you endeavour to give to the Body and to the Hollow of the Articulation of the luxated Bone the proper Situation and Steadineſs neceſſary for the Succeſs of the Operation, which is eaſily executed with this Machine, by the Girts of the Bodice, of which the horizontal one keeps the Patient's Breaſt cloſely applied againſt this Piece, and the vertical Girt retains the *Scapula*, the *Clavicula*, in ſhort, all the Parts where the Bone is to be puſhed back, in a Situation proper for receiving it, and for not deviating by yielding to the Efforts of the Machine.

Every thing being thus diſpoſed, the Surgeon places himſelf behind the Patient, mounted upon ſomething that raiſes him high enough to inſpect the Effects of the Proceſs; to examine by the Touch where it operates; in ſhort, to conduct the Whole by Feeling and by the Eye. The Surgeon being placed, the Aſſiſtant who is to conduct the Extremity of the Lever, works it according to his Directions, but perfectly ſlowly, that the Extenſions may be made with leſs Pain, and more effectually.

If the Luxation is below, it is ſufficient for its Reduction to lower the Extremity of the Lever, as is done with the *Ambe* of *Hippocrates*. But here appears a great Difference between the working or playing of theſe Two Sorts of Levers. The *Ambe* of *Hippocrates* is a plain Lever *A*, *B*, Fig. 2. TAB. IV. the Motion of which is from *A* to *a*, and conſequently has for its Extenſion only the Space *C*, *a*, when it is brought to its laſt Term of becoming perpendicular, *a*, *b*, whilſt it has all *A*, *C*, or 1, *a*, for its Elevation. The *Ambe* of *Hippocrates* therefore almoſt only raiſes the Bone of the Arm, without ſcarcely ſtretching it; and this is the Defect, which M. *Petit* with Reaſon blames it for; and which is ſtill more ſenſible, if one takes the Action of the Lever in *D*, the Point whereabouts it muſt meet the Edge of the Cavity, and may cauſe thoſe Miſchiefs that are apprehended from it; but inſtead of placing the fixed Point of that Lever in 1, lower it to 2, by the means of the Tenant 1, 2; then the Direction of the End of the Lever becomes *A*, *E*; its Elevation is but 1, *h*; and the Extention it produces is *A*, *E*, or *D*, *E*: If you lower ſtill the Lever's Point of Reſt, as in 3, by a longer Spur, the Elevation of its Extremity is reduced to 1, *k*; and the Extenſion it produces, reaches from *A* to *F*, if one carries thoſe Levers as far as they will go, which is never neceſſary. In ſhort, it will be in your Power to give to this Lever an Extenſion as great as you pleaſe, joined to a very ſmall Elevation: To this End you need only ſet backwarder the Lever's Point of Reſt, along the Perpendicular marked in Fig. 2. TAB. IV. Now this is preciſely what the Spur does, which we have added to our *Ambe*; the Holes it is pierced with, as well as the Mortiſe of the Foot, are placed in different Degrees, as the Points 1, 2, 3; and theſe Holes, as has been ſaid, are the Places of the Pin which forms the Lever's Hinge or Point of Reſt.

The Gradation of thoſe Holes therefore enables you to augment at Will *the Extenſion*, whilſt the Elevation diminiſhes in the ſame Proportion; but if you have a mind the Elevation ſhould diminiſh more or leſs than in the foreſaid Proportion, for Inſtance, you want to make a great Extenſion, and a very ſmall Elevation, there is nothing eaſier for it than our Machine. You need only puſh the Spur 1, 3, which is moveable, as you know, towards the End of the Lever to *L*, and ſtop it there: Then the End of the Lever *A*, *L*, being very ſhort, it has but little room to play; on the contrary, if you will have a great Elevation, you need only bring back the ſaid Spur to *M*, or 1, or ſtill farther; the farther you remove from the End of the Lever, the more it will have room to play, and the more conſiderable will be its Elevation. It is true, the Power of the Lever will decreaſe in the ſame Proportion; but this Power is ſo great, that Loſſes like this ought to be reckoned for nothing.

You have it therefore in your Power with this ſort of *Ambe* to make, as Occaſion requires, ſuch Extenſions and Counter-extenſions as you pleaſe; and you may likewiſe vary all the Degrees of the Elevation, which ſhall be neceſſary to give to the Bone that is

to

to be reduced; and theſe are the Perfections which have been hitherto required in this Machine.

Commonly, when the Bone of the Arm is ſufficiently ſtretched and raiſed, ſo as to be on a Level with the Cavity of the Articulation, thoſe Bones replace themſelves as it were of themſelves, becauſe this Level is not always exact; on the contrary, the Extenſion and Counter-extenſion being never regular enough to hinder the *Scapula*, which is a moveable Part, from following a little the Head of the Bone, or its Extenſion, it happens almoſt always, that this Head bears pretty ſtrongly againſt the Edge of the Cavity, and conſequently does not fail to fall into the ſaid Cavity, as ſoon as it has only paſſed its Edge, and even before it has met the Level, or the Axis of the Hollow of the Articulation; but it is otherwiſe after an Extenſion, a Counter-extenſion, and an Elevation ſo regular as thoſe which may be performed by our Machine; it may happen, that after the Three preceding Operations, the Head of the Bone, without having touched the Edge of the Cavity, will be placed over-againſt this Cavity, and upon a Level with its Axis, without being able to enter into it, by reaſon of the Firmneſs and Exactneſs of the Powers for retaining the oppoſite Parts in this State of regular Extenſion; and, in this Caſe, there will remain for you, in order to finiſh the Operation, to conduct the Head of the Bone into its Cavity, or to let it go into it: But what will you do then? If you ſlacken the Extremity of the Lever, or if you lift the ſame up, you will bring the Head back to the ſame Place where you took it up; that is to ſay, you will bring the Luxation to its former State. If you reſolve to relax the running Knots, the Operation will be long, and your Patient will have time enough to cry out.

In order to avoid theſe Inconvenients, I mounted the Bracer on the Lever in a Groove, and I ſtopped it in this State by the Teeth of its elaſtic Tail; by the means of this Conſtruction, when the Surgeon perceives, that the Bone is over-againſt its Cavity, he directs the Aſſiſtant who attends the Extremity of the Lever, to preſs upon the Handle (TAB. IV. Fig. 1.) *D* of the elaſtic Tail of the Bracer, to the end that the Teeth placed under the Arch *C*, near the ſaid Handle, may quit their Hold, and that the whole Bracer, which is now no longer ſtopped, may ſlide on the Lever towards the Patient, and by this means let the Head of the Bone enter into its Cavity.

The Neceſſity of this Management with our *Ambe* is a Demonſtration, that it is far from having that capital Fault with which M. *Petit* reproaches the *Ambe* of *Hippocrates: viz.* "That it puſhes the "Head of the Bone into its Cavity, before the Ex"tenſion and Counter-extenſion are made." I hope the Machines, whereby I have prevented this Fault, and have procured to my *Ambe* the oppoſite Perfections, will appear ſufficiently ſimple.

If any body ſhould be apprehenſive, that the re-entering of the Head of the Bone might be too ſudden, and occaſion a Shock that might hurt the ſaid Bones, it will be eaſy to remedy againſt it, by ſubſtituting to the Stop, into which catch the Teeth of the Bracer, a toothed Wheel *A*, (Fig. 5. TAB. III.) having in its Centre a Handle *B*, *D*; which Handle during the Operation will be ſtopped by the Piece of Iron *C*, fixed upon this Piece by the Skrew *F*; the ſaid Handle

will

will alſo ſtop the Teeth *E*, which catch into the tooth'd Wheel; and when the Bracer is to be looſened, the Aſſiſtant, who holds the Lever with one Hand, will take the Handle with the other, and having got the Skrew *F* taken off, he will remove from the Piece *C*, that ſtops it, the Part *D*, *B*, of the Handle, by the means of its moveable Arbor *D*, ſo that the Handle will come at a Right Angle, as it is repreſented by Dots: Then the Aſſiſtant's Hand, ſuſtaining all the Effort of the Handle and of the Bracer, will moderate by the Handle the ſliding of the Bracer, and the entering of the Head of the Bone into its Cavity, with all the Slowneſs he ſhall think proper for this Operation.

Thus much concerning the Reduction of a Luxation of the Arm below; it is known, that this is the only ſort of Luxation in which the *Ambe* of *Hippocrates* can be made uſe of (the ſecond Defect obſerved by M. *Petit* in this Machine). I have ſucceeded in remedying againſt this Defect by the ſimpleſt thing in the World, *viz.* by giving to the Foot that enters into the Arm of the Chair a cylindrical Shape, by which means it is able to turn all manner of ways; ſo that if the Luxation is forwards, one only needs turn the Extremity of the Lever accordingly, lowering it at the ſame time enough to make the neceſſary Extenſion and Elevation; by this Turn of the Extremity of the Lever forwards, the Head of the Bone is of neceſſity carried backwards, and replaced into its Cavity. One eaſily conceives, that one muſt go to work in the oppoſite way, when the Luxation is backwards, and ſo on as for the reſt; all according to the Directions of the Surgeon placed at the Articulation, who is to be attentive to examine the State of the Parts, and to order in what Direction and how much is neceſſary to be done.

III. *The Continuation of* An Account of a Treatiſe of Fluxions, *&c.* Book II. *by* Colin Mc Laurin, *Prof. Mathem.* Edinburgh. F. R. S. *

Preſented March 10. 1742-3.

IN the firſt Book, the Author deſcribed the Method of Fluxions, and its Application to Problems of different Kinds, without making uſe of any particular Signs or Characters, by geometrical Demonſtrations, that its Evidence might appear in the moſt ſimple and plain Form. In the ſecond Book, he treats of the Method of Computation, or the Algebraic Part; to the Facility, Conciſeneſs, and great Extent of which, the Improvements that have been made by this Method are in great meaſure to be aſcribed. In order to obtain thoſe Advantages, it was neceſſary to admit various Symbols into the Algebra: But the Number and Complication of thoſe Signs muſt occaſion ſome Obſcurity in this Art, unleſs Care be taken to define their Uſe and Import clearly, with the Nature of the ſeveral Operations. An Example of this is given by an Illuſtration of one of the firſt Rules in Algebra. As it is the Nature of Quantity to be capable of Augmentation and Diminution, ſo Addition and Subſtraction are the primary Operations in the Sciences that treat of it. The poſitive Sign implies an Increment,

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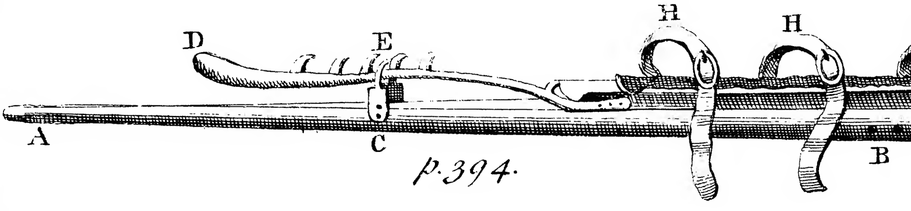
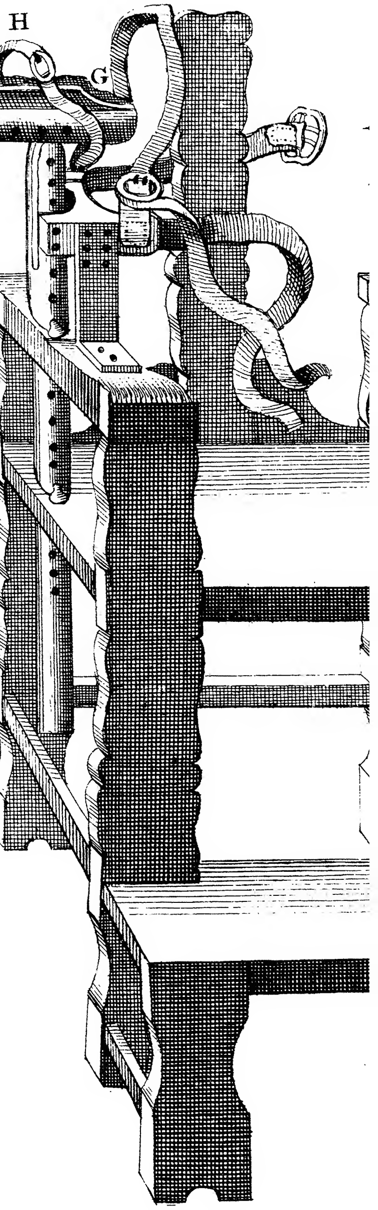
* See the Beginning of this Account, N° 468. p. 325.

Philos. Transact. N° *469.* TAB. II.



p.394.



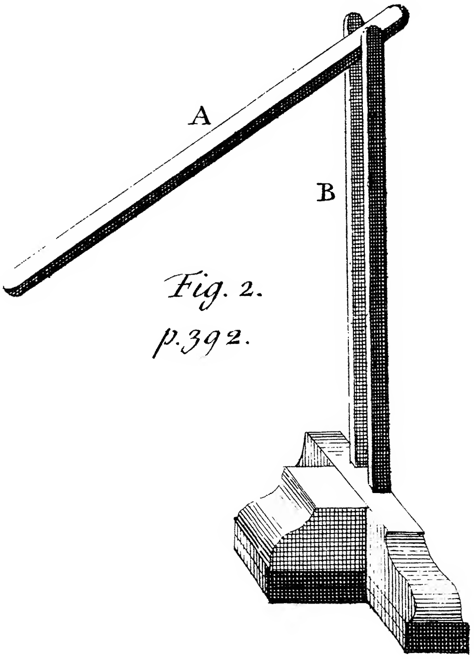
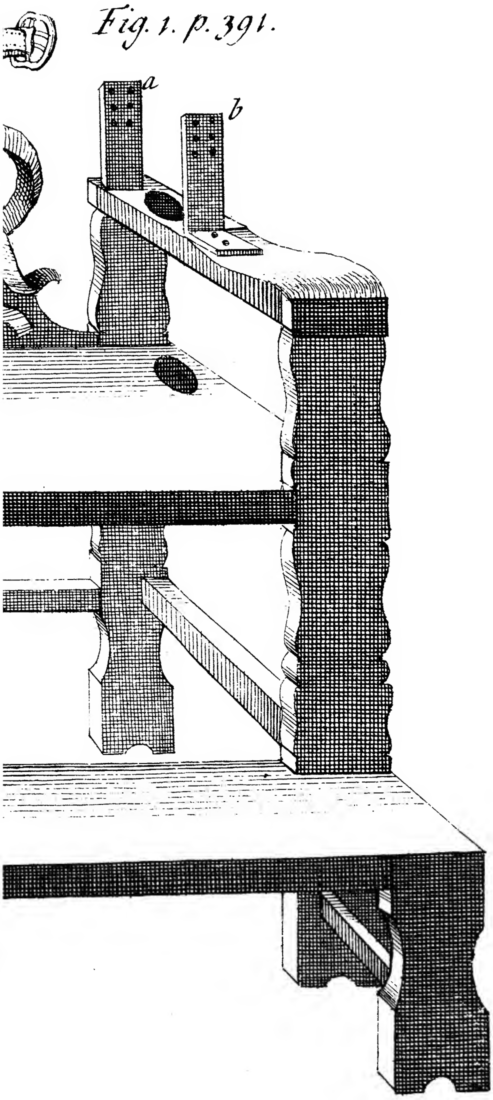


Fig. 2.
p.392.

A Scale of Feet to be meaſured upon the fore part of the Fi

Fig. 1. p. 391.



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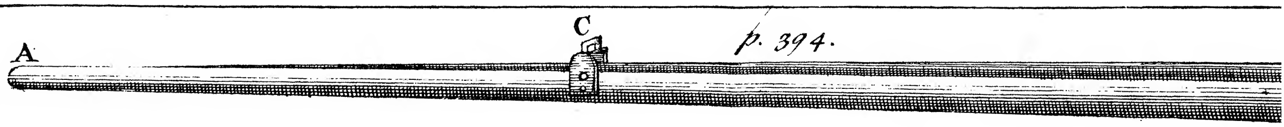
J. Mynde ſc.



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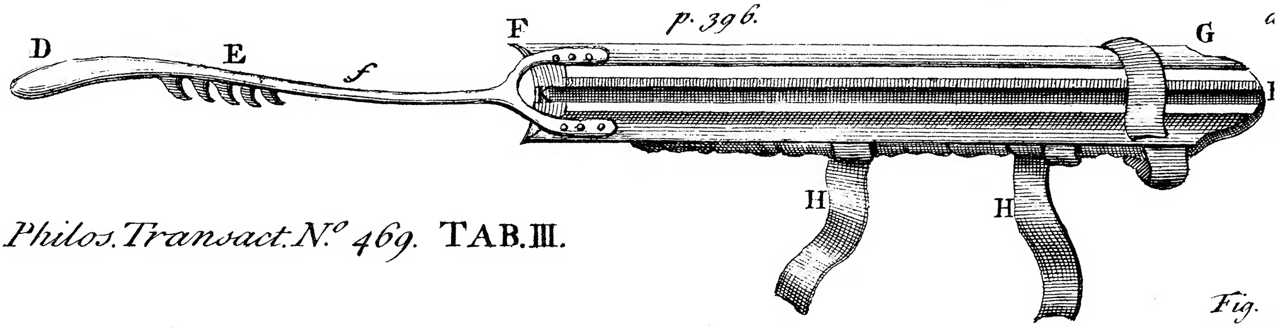

p. 396.

Philos. Transact. N.º 469. **TAB. III.**

Fig.
p. 393

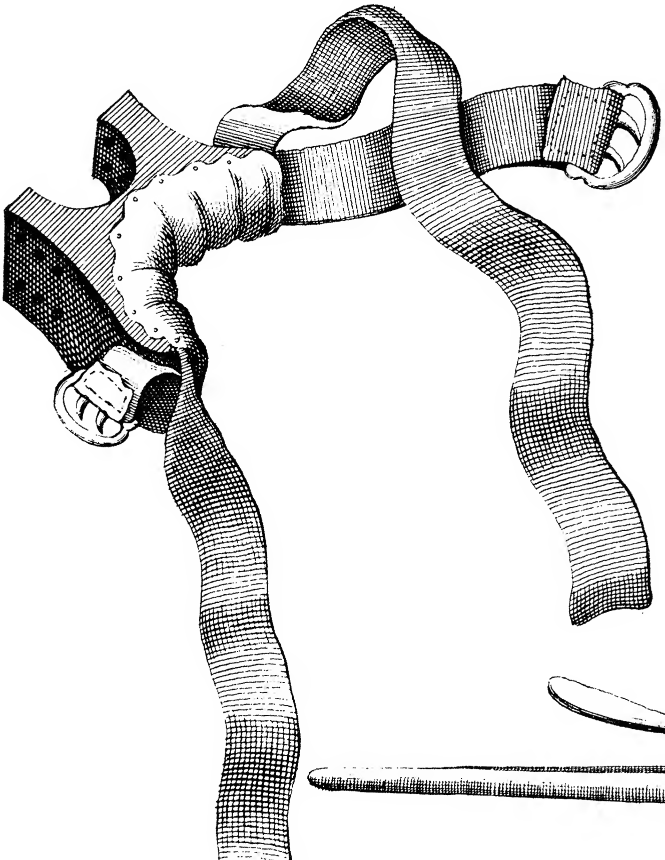

Fig. 1.
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p 3

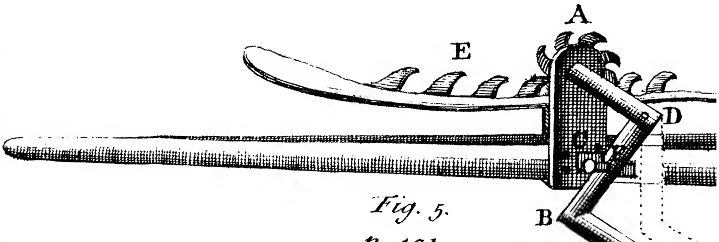

Fig. 5.
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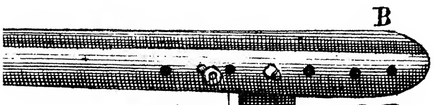

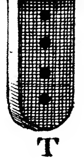

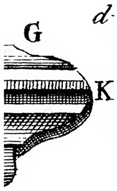

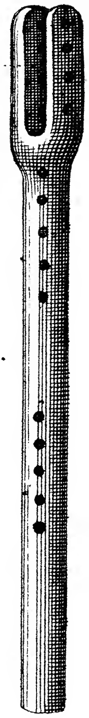

Fig. 2.
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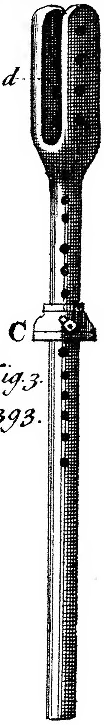

Fig. 3.
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Fig. 4.
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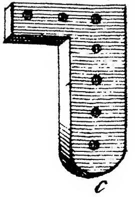

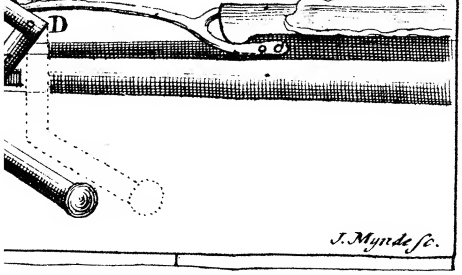

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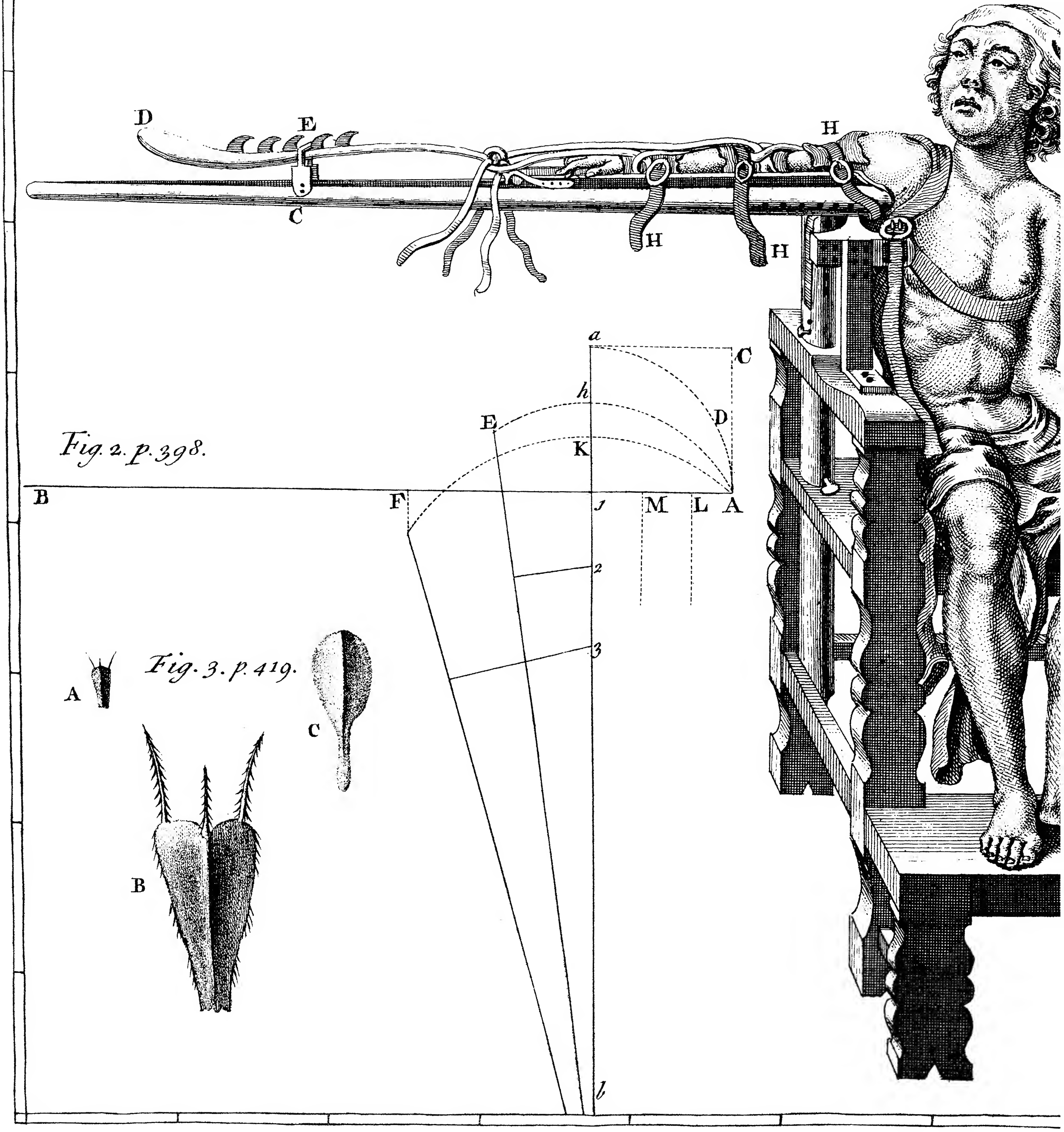
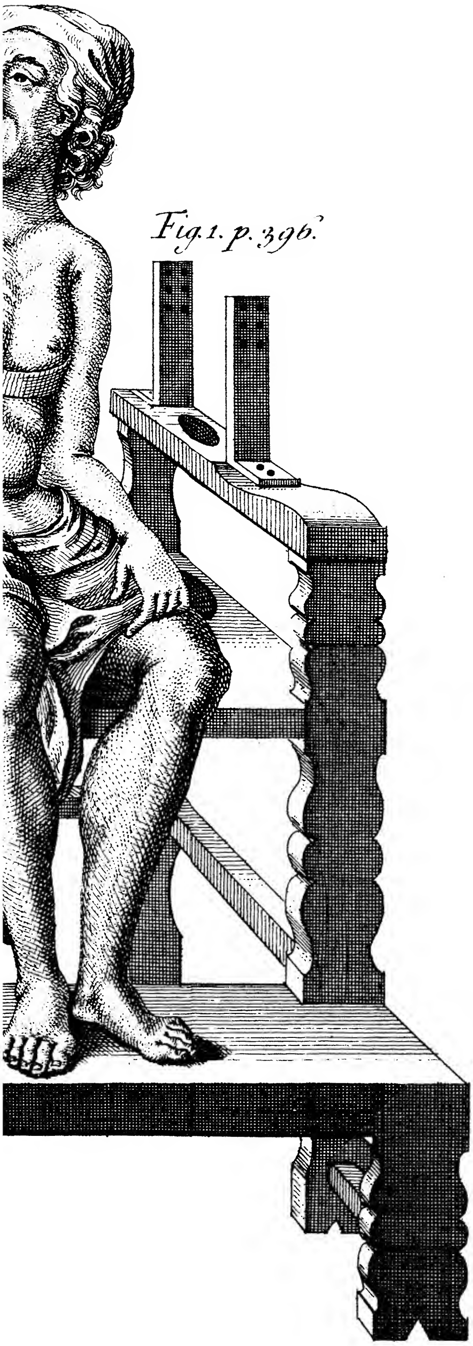


Fig. 2. p. 398.

Fig. 3. p. 419.

Fig. 1. p. 396.



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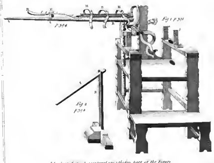
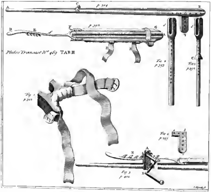


A Scale of Feet b c compared upon the fore part of the Figure

Philos Transact Nº 469 TAB III



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